

# Work Order ID 66668

Wednesday, February 23, 2011 2:16:32 PM

Page 1

Item ID: D205-634-041

Accept

Setup Start

Revision ID:

Stop

Item Name: Replacement Skidtube

Start Date: 2/23/2011 Start Qty: 1.00

Cust Item ID:

Required Date: 3/11/2011 Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan:

Date: 11-02-23

Tooling:

Date:

Run Start

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

Draw Nbr

Revision Nbr

D2580

Rev.D DEO-D1

100

0.00



DC

Document Control

DOCUMENT CONTROL

Memo

0.00

Photocopy D205-634 bluefile & type labels per PPP D205-634-041 CHG003

110

0.00



CNC Bend 1

CNC Delta 100 Bender

BENDING MACHINE - SKIDTUBES

Memo

0.00

per program D2580.C on CNC Bender and Folio 16

per Dwg. D2580

in aft end of tube

Handwritten signature and date 11-3-8

DRAB GREEN

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

120

0.00



Skidtubes

Memo

0.00

1- Deburr ends and remove bending marks

2- Prepare tube for swaging as per QSI 002

130

0.00



QC

QC5- Inspect part completeness to step on W/O

Memo

0.00

Quality Control

15-3-9

1 0 BE 11/03/09

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start  
Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

140

0.00



Skidtubes

Skidtubes

Memo

0.00

1-Weld step D2576 as per Dwg. D2580 and QSI 004

A/R□□□ Aluminum Rod

2-Grind welds on step as per Dwg D2580

3-Insert D4202-1 spacer, swage as per QSI002 and trim/ grind flush per QSI002 and dwg. Hold x-bolt with DT9701 Use tube expander 1/2 x17G to start expansion and finish with 1/2 x 18G to achieve dwg dimension.

4-Drill holes for wearplates using DT 8217 &amp; DT8937 Open holes to 19/64", adjust stopper not to hit web. Debur

6-Drill pilot holes for aft cap using DT 8215 Open holes to 0.208". Debur

7-Drill pilot holes for Tow ring using DT8091, open to .640" and Debur

150



QC

Quality Control

QC10- Inspect visual per QSI004- ground welds

0.00

Memo

0.00

Sulog 117

BE 11/03/09

DP 11-3-9

DP 11-3-9

Pro →

BE/ BB

11/05/10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D205-634-041 PAR #: \_\_\_\_\_ Fault Category: Eng-design NCR: Yes No DQA: \_\_\_\_\_ Date: 11/03/28  
 Resolution: rework Disposition: rework QA: N/C Closed: OK Date: 11/03/28

NCR: 66668		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification * Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11/03/14	# 140	Found at inspection that the cross bolt spacers have cracks in them.  Some large + some small <del>RC Process</del> (Swagson) R.C. Design: x-bolt wall too thick re swinging.	JP 11.03.17 JS/042	→ Drill out + removed cracked cross bolt spacers  hubs REPLACE FROM AFT END 11,14,15,18,19,20 + HOLE (x6) WITH .049 WALL 742021 B67308	JP 11-3-15 BE 11/03/16	S 11/03/17	JP 11.03.17 JS/042	S 11/03/14

NOTE: Date & initial all entries

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Start Date: 2/23/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 3/11/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160  QC Quality Control	QC5- Inspect part completeness to step on W/O  Memo: no cracks	0.00 0.00							
170  HandFinish Hand Finishing	Pressure Wash per QSI005 4.3  Memo: Re-alodine tube as per QSI 005 section 4.1.2.1 do not acid etch and leave fwd cap out of solution.	0.00 0.00							1 BR 11-3-17.
180  Powdercoat Powder Coating	White Gloss(Ref:4.3.5.1) per QSI005 4.3-Alum  Memo: DRAB GREEN START TIME: 3:50 OVEN TEMPERATURE: 320° FINISH TIME: 4:20	0.00 0.00							1 BR 11-3-17

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

190

QC3- Inspect Part Finish

0.00

QC

Memo

0.00

Quality Control

= 7m-L 11/03/21

(12)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

200

0.00



HandFinish

Hand Finishing

Memo

0.00

1-Install inserts &amp; wearplates &amp; Gaskets as per Dwg. D2580. Use a drop of Sikaflex on insert holes before installing wearplates

A/R ☐ ☐ ☐ Sikaflex-291 ☐ ☐ ☐ M116040

Sikaflex expire date: 11/08

2-Coat D2594-3 O' rings with Petroleum Jelly and install on D2594-1 plugs as per Dwg D2580

3-Inspect for foreign object per QSI 024

4-Install 2855 Aft Cap as per Dwg D2580 and seal Fwd Step &amp; Aft Cap with Sikaflex. Clean excess adhesive

A/R ☐ ☐ ☐ Sikaflex-291 ☐ ☐ ☐ M116040

Sikaflex expire date: 11/08

5-Wing Walk as per Dwg D2580 and QSI 005 4.4

Batch:

M116402

M-11/03/21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Required Date: 3/11/2011 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start  
Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210 QC Quality Control	QC5- Inspect part completeness to step on W/O  Memo Inspect Aft Cap, Fwd Step and Wing Walk of work to Current Step Inspect for Foreign objects per QSI 024	0.00 0.00							
220 Packaging Packaging	Packaging  Memo Identify and pack for shipping as per PPPD205-634-041 Location: PPP Rev: <u>PPPG7113</u>	0.00 0.00							
230 QC Quality Control	QC21- Final Inspection - Work Order Release  Memo	0.00 0.00							

XC

Cup/3/22

11/3/22

MF

11-03-22

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 1

Work Order ID: 66668

Parent Item: D205-634-041

Parent Item Name: Replacement Skidtube




Start Date: 2/23/2011

Required Date: 3/11/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:N 02.08.28 FP was QC5 in Step 27; Added QC5 to Step 30  
KJ IPP Rev P 10.02.19  
per PAR09-043 EC verified by:DD  
IPP Rev. O 06.02.28 Added paperwork EC  
IPP Rev:P 07-07-09 SS Wearplates & Gaskets JLM IPP Rev:Q  
10.12.01 as per chg003 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D4202-1  Spacer		Manufactured	No			140	Each	166.0000	20	20			
<div> <div>Location</div> <div>Loc Qty</div> <div>Loc Code</div> </div>													
<div> <div>LG 66121</div> <div>65529</div> <div>166</div> <div>166</div> </div>													
D2580-1  205 Skidtube bent detail		Manufactured	No			110	Each	5.0000	1	1			
<div> <div>Location</div> <div>Loc Qty</div> <div>Loc Code</div> </div>													
<div> <div>ST046 66727</div> <div>59856</div> <div>66095</div> <div>66268</div> <div>5</div> <div>1</div> <div>2</div> <div>2</div> </div>													
D2576-3  Step (maching detail)		Manufactured	No			140	Each	52.0000	1	1			
<div> <div>Location</div> <div>Loc Qty</div> <div>Loc Code</div> </div>													
<div> <div>LG 46661</div> <div>52215</div> <div>52</div> <div>4</div> <div>48</div> </div>													

20 DP 11-3-9

1 DP 11-3-8

8E 11/03/09

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Page 2

Work Order ID: 66668

Parent Item: D205-634-041

Parent Item Name: Replacement Skidtube

Start Date: 2/23/2011

Required Date: 3/11/2011

Start Qty: 1.00

Required Qty: 1.00

D2855 Manufactured No

200 Each

42.0000



Cap

Location

Loc Qty

Loc Code

FP6 1  
56613 1  
ST026 41  
50513 1  
50770 28  
51539 2  
53791 10

65819



1  
m-l 11/03/21  
1x

AN3-5A Purchased No

200 Each

732.0000



Bolt

Location

Loc Qty

Loc Code

ST350 732  
115016 ✓ 56  
115371 500  
116632 176



2  
m-l 11/03/21  
2x

AN960JD10L ~~NAS1149D03321~~ Purchased No

200 Each

6.0000



Washer

Location

Loc Qty

Loc Code

ST335 6  
11912 6

117010



2  
m-l 11/03/21  
2x

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Shop Packet Print

Page 2

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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item: D205-634-041

Parent Item Name: Replacement Skidtube

Start Date: 2/23/2011

Required Date: 3/11/2011

Start Qty: 1.00

Required Qty: 1.00

ALS7-1032-130

Purchased

No

200

Each

1,814.000

50

50



Insert

Location

Loc Qty

Loc Code

FP

21

115079

21

ST282

1793

111529

32

113238

17

115502

500

115581

244

116800

1000

M-L 11/03/21

50X

AN3C4A

Purchased

No

200

Each

2,296.000

50

50



BOLT

Location

Loc Qty

Loc Code

ST350

2296

115300

25

116075

337

116704

734

116924

1200

M-L 11/03/21

50X

AN960C10L

NAS1149C0332

Purchased

No

200

Each

127.0000

50

50



washer

Location

Loc Qty

Loc Code

ST245

127

107534

59

108246

68

116304

M-L 11/03/21

50X

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Parent Item: D205-634-041





Parent Item Name: Replacement Skidtube

Start Date: 2/23/2011


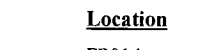
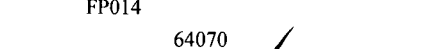

Required Date: 3/11/2011

Start Qty: 1.00



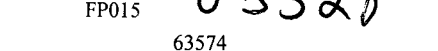

Required Qty: 1.00

D3566-13      Manufactured      No      200      Each      34.0000      1      1  
    m-l 11/03/21  
Gasket



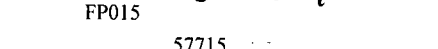

Location	Loc Qty	Loc Code
FP014	34	
64070	17	
66137 ✓	17	

D3566-5      Manufactured      No      200      Each      13.0000      1      1  
    1X  
Gasket

Location	Loc Qty	Loc Code
FP015 65528	13	
63574	1	
66146	12	

D3566-1      Manufactured      No      200      Each      33.0000      2      2  
    m-l 11/03/21  
Gasket

Location	Loc Qty	Loc Code
FP015 66548	33	
57715	1	
66040	20	
66129	12	

D3564-11      Manufactured      No      200      Each      11.0000      1      1  
    m-l 11/03/21  
Wearshoe

Location	Loc Qty	Loc Code
FP019 66554	11	
65159	11	

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Required Date: 3/11/2011

Start Qty: 1.00

Required Qty: 1.00

D3564-13

Manufactured No

200 Each

25.0000

1

1



Wearshoe

Location

66805

Loc Qty

Loc Code

FP17

25

59660

1

62229

2

66136

22



m-l 11/03/21

1X

D3564-9

Manufactured No

200 Each

4.0000

1

1



Wearshoe

Location

65524

Loc Qty

Loc Code

FP

1

55334

1

FP19

3

62238

3



m-l 11/03/21

1X

D3564-5

Manufactured No

200 Each

19.0000

1

1



Wearshoe

Location

66551

Loc Qty

Loc Code

FG

1

34806

1

FP19

2

57525

1

58709

1

FP-19

16

63575

1

66148

15



m-l 11/03/21

1X

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



# Picklist Print

Wednesday, February 23, 2011 2:16:41 PM

Page 6

Work Order ID: 66668

Parent Item: D205-634-041

Parent Item Name: Replacement Skidtube

Start Date: 2/23/2011

Required Date: 3/11/2011

Start Qty: 1.00

Required Qty: 1.00

D2594-3

Manufactured No

200 Each

1,031.000

16 16



O-Ring, 205 Skidtube

Location

Loc Qty

Loc Code

FP	543	
55546	19	
58191	12	
59358	12	
65518	500	
fpa	488	
61762 ✓	488	



m-11/03/21

D2594-1

Manufactured No

200 Each

327.0000

16 16



Plug, 205 Skidtube

Location

Loc Qty

Loc Code

FP	183	
42807	112	
55002	71	
FP14	144	
58434	15	
65980	129	



16x  
m-11/03/21

67441

16x

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**DART**

DESIGN <i>[Signature]</i>	DRAWN BY <i>[Signature]</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D2580	REV. D SHEET 1 OF 3
DATE 07.02.27		TITLE 205 SKIDTUBE ASSEMBLY	SCALE NTS
A	96.09.16	NEW ISSUE	
B	96.12.02	AS MANUFACTURED	
C	98.08.26	REDRAWN, INCLUDED DEO 9094/9097	
D	07.02.27	CHANGE TO SS WEARPLATES AND GASKETS, INCLUDE DEO 9124/9183	

**RELEASED**  
07-06-28 *[Signature]***DEO ATTACHED**

QTY -041	QTY -045	Part Number	Description
X		D2580-041	SKIDTUBE ASSEMBLY
	X	D2580-045	SKIDTUBE ASSEMBLY
1	1	D2500-1-190	EXTRUSION
1	1	D2576-3	STEP
20	24	D2579	CROSS BOLT SPACER
16	16	D2594-1	PLUG
16	16	D2594-3	O-RING
1	1	D2596	205 WEB
1	1	D2855	AFT CAP
1	1	D3564-5	WEARSHOE
1	1	D3564-9	WEARSHOE
1	1	D3564-11	WEARSHOE
1	1	D3564-13	WEARSHOE
2	2	D3566-1	GASKET
1	1	D3566-5	GASKET
1	1	D3566-13	GASKET
50	50	ALS7-1032-130 or AKS7-1032-130 or AKS4-1032-130 or AELS-1032-130	INSERT
50	50	AN3C4A	BOLT
2	2	AN3-5A	BOLT
50	50	AN960C10L	WASHER
2	2	AN960JD10L	WASHER

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 66668

*PL 11-02-28*

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 2) ALL DIMENSIONS ARE IN INCHES
- 3) INSERT D2596 WEB TO LOCATION SHOWN OFF AFT END OF SKIDTUBE AND BOND WEB INTO OUTER TUBE WITH NON-STRUCTURAL SIKAFLEX-241 ADHESIVE PER DART QSI 015 BEFORE BENDING. ENSURE HOLES LINE-UP.
- 4) BEND AS A SMOOTH RADIUS STARTING WITH A MAXIMUM CENTERLINE RADIUS OF 60 AND ENDING WITH A MINIMUM RADIUS OF 30. A MAXIMUM REDUCTION OF 0.200 IN DIAMETER IS ALLOWABLE IN THE BENT PORTION OF THE TUBE.
- 5) USE DART DRILL TEMPLATE TD2577-205 TO LOCATE AND DRILL Ø0.297 HOLES FOR WEARSHOE INSERTS. INSTALL ALS7-1032-130 PER SECTION D-D (50 PLACES) AFTER FINISH. INSTALL AN3C4A BOLTS AND AN960C10L WASHERS WITH SIKAFLEX-241/-291.
- 6) WELDING TO BE DONE PER DART QSI 004.
- 7) FINISH:  
SEE NOTES ON  
PAGE 2 FOR D2580-041 AND  
PAGE 3 FOR D2580-045
- 8) INSERT D2594-1 PLUG C/W D2594-3 O-RING IN HOLES MARKED 'P' (BOTH SIDES OF TUBE) AFTER FINISH (16 PLACES).

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Diagram illustrating the grinding locations and dimensions for the propeller cross-section:

- GRIND FLUSH (4 PLACES)
- GRIND FLUSH
- D2576-3 STEP
- GRIND FLUSH
- LOCATION RIDGE ON UNDERSIDE OF D2576
- $V_{14}$

RELEASED  
07-06-28

**DETAIL C**  
SCALE 5:24

Technical drawing of a circular component with a central hole and a rectangular slot. The drawing includes dimension lines and labels for various parts and materials:

- DRILL PRIOR TO D2855 CAP INSTALLATION (2 PLACES)
- SEAL WITH SIKAFLEX-241/-291
- AN3-5A BOLT (1)
- AN960JDTOL WASHER (1) (2 PLACES)
- D2855 CAP
- 0.40

Diagram illustrating the components of a wheel assembly:

- D2579 SPACER
- D2596 WEB (REF)
- ALS7-1032-130 (REF) (TYP 50 PLACES)
- AFTER PERFORM
- 1. CHA
- 2. INS
- 3. WEI
- 4. C'B

AFTER DRILLING AND BENDING ASSEMBLY  
PERFORM THE FOLLOWING FOR Ø0.508 HOLES ONLY:

1. CHAMFER HOLE 0.050 X 45°
2. INSERT D2579 SPACER (20 PLACES)
3. WELD INTO PLACE AND GRIND FLUSH
4. C'BORE D2579 SPACER TO Ø0.437 X 1.00 DEEP

i) FINISH: ACID ETCH, ALODINE PER DART QSI 005 4.1 PRIOR TO INSERTING D2596 WEB POWDER COAT ASSEMBLY GLOSS WHITE (REF. 4.3.5.1) PER DART QSI 005 4.3 BLACK ANTI-SKID PAINT AS INDICATED PER DART QSI 005 4.4

37.50  
DISTANCE TO AFT END  
OF D2596 WEB

3  
7

1.750 1.750

0.508 (TYP.)  
(40 PLACES)

REFER TO DETAIL A

8.750

17.375

26.000

34.188

57.313 (REF)  
7 EQUAL SPACES  
8.188 PITCH

38.0

91.500

190.0  
(D2500-1)

0.5

1.5

1.5

0

0

P

P

P

P

P

P

P

WELD AS PER DETAIL B

BLACK ANTI-SKID TO 0.5 ABOVE LOCATION RIDGE

BLACK ANTI-SKID TOP OF STEP TO 0.5 ABOVE BOTTOM EDGE

0.5

1.5

1.5

1.5

0

0

P

P

P

P

P

P

P

REFER TO DETAIL C

D3566-1

D3566-5

D3566-1

D3566-13

D3564-11

D3564-5

D3564-9

D3564-13

AN3C4A BOLT (1)

AN960C10L WASHER (1)

(50 PLACES)

DESIGN

DRAWN BY

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DART AEROSPACE LTD.

DESIGN	<i>[Signature]</i>
CHECKED	<i>[Signature]</i>
DATE	07.02.27

	DRAWN BY <b>PH</b>
	APPROVED <b>H</b>

**DART AEROSPACE LTD.**  
HAYDENSEBURY, ONTARIO, CANADA

DRAWING NO.	D2580
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TITLE	205 SKIDTUBE ASSEMBLY
-------	-----------------------

REV. D
SHEET 2 OF 3
SCALE
1:24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

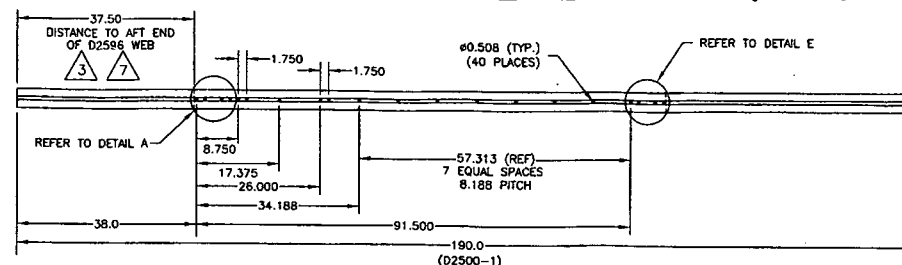
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

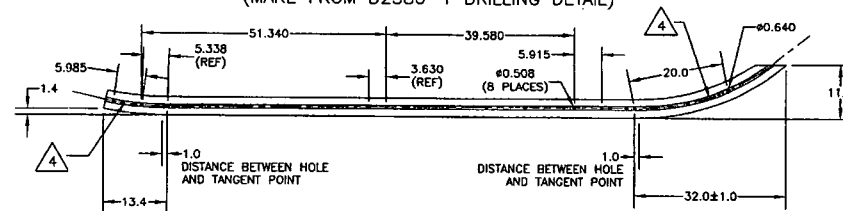
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

D2580-1 DRILLING DETAIL

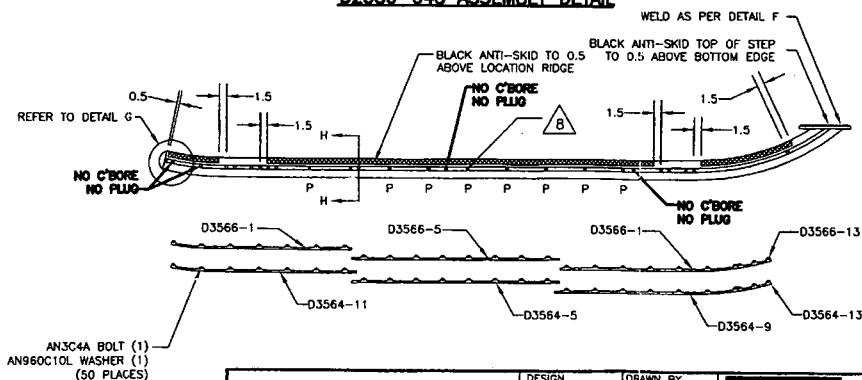


**D2580-5 BENDING AND CUTTING DETAIL**  
(MAKE FROM D2580-1 DRILLING DETAIL)



**D2580-045 ASSEMBLY DETAIL**

**DETAIL G**  
SCALE 5:24



02579 SPACER

WEB (REF)

-130 (REF)

0 PLACES)

AFTER PERFOM

1. CH
2. INS
3. WE
4. C'E

AFTER DRILLING AND BENDING ASSEMBLY  
PERFORM THE FOLLOWING FOR Ø0.508 HOLES ONLY:

1. CHAMFER HOLE 0.050 X 45°
2. INSERT D2579 SPACER (20 PLACES)
3. WELD INTO PLACE AND GRIND FLUSH
4. C'BORE D2579 SPACER TO Ø0.437 X 1.00 DEEP

**D2580-045 NOTES**

- i) FINISH: ACID ETCH, ALODINE PER DART QSI 005 4.1 PRIOR TO INSERTING D2596 WEB  
POWDER COAT ENTIRE ASSEMBLY GREEN (REF. 4.3.5.8) PER DART QSI 005 4.3  
BLACK ANTI-SKID PAINT AS INDICATED PER DART QSI 005 4.4
- ii) IT IS ACCEPTABLE TO GRIND A RELIEF IN THE D2855 AFT CAP TO PREVENT INTERFERENCE  
WITH THE SPACER AT THIS LOCATION

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DESIGN

4

CHECKING

CHECKRE

L

DATE \_\_\_\_\_

07.02

**DRAWN BY**

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**PART**

**DART AEROSPACE LTD.**

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DRAWING NO. 5-5555

D2580

TITLE	
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205 SKI

PARKESTOWN, ONTARIO, CANADA

RE

SHEET 3 OF 3

SO

## ASSEMBLY

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DRAWING NO. D2580	TITLE 205 SKIDTUBE ASSEMBLY	REV. D	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D2580-D-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>UP</i>	CHECKED <i>L</i>	MFG. APPR. <i>R</i>	APPROVED <i>MP</i>		DE APPR. <i>#</i>		
DATE 10.09.22	DATE 10.11.04	DATE 10.11.04	DATE 10/14/04		DATE 10.11.04		

**PURPOSE:**

CHANGE ALL WELDED CROSSBOLT SPACERS TO SWAGED SPACERS

**CHANGE:**

PARTS LIST IS AMENDED AS FOLLOWS:

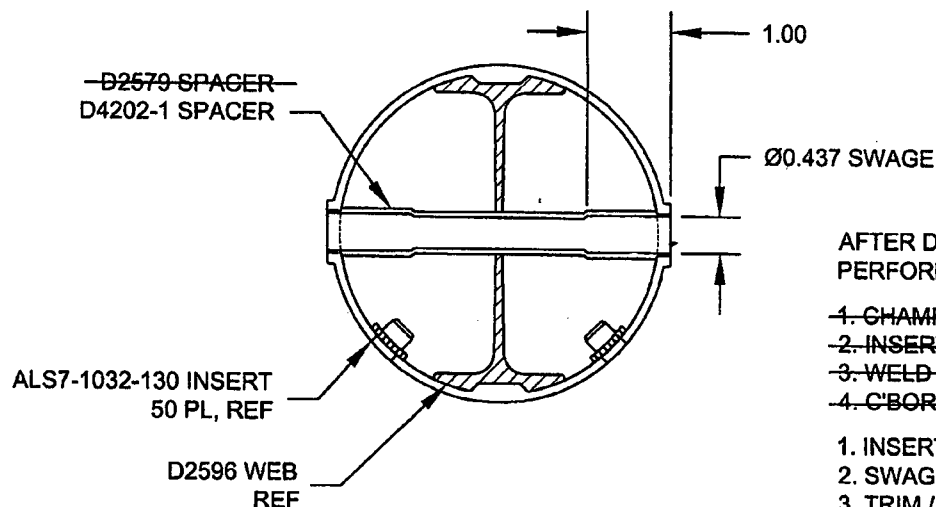
WAS

QTY	QTY	PART NUMBER	DESCRIPTION
-041	-045		
20	24	D2579	CROSS BOLT SPACER

IS

20	24	D4202-1	SPACER
----	----	---------	--------

SECTION D-D & SECTION H-H ARE AMENDED AS FOLLOWS:



**SECTION D-D**  
NOT TO SCALE

**SECTION H-H**  
NOT TO SCALE

**RELEASED**  
2010-11-18  
*MP*

AFTER DRILLING AND BENDING ASSEMBLY  
PERFORM THE FOLLOWING FOR Ø0.508 HOLES ONLY:

1. CHAMFER HOLE 0.050 X 45°
2. INSERT D2579 SPACER (20 PLACES)
3. WELD INTO PLACE AND GRIND FLUSH
4. C-BORE D2579 SPACER TO Ø0.437 X 1.00 DEEP

1. INSERT D4202-1 SPACER, 20 PL (-041) OR 24 PL (-045)
2. SWAGE TO Ø0.437 X 1.00 DEEP PER QSI 002
3. TRIM / GRIND FLUSH PER QSI 002

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

## Chris Provencal

---

**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** March 16, 2011 6:21 PM  
**To:** 'Chris Provencal'  
**Cc:** 'Mike Petsche'; 'Linda Lacelle'; 'Bill Beckett'  
**Subject:** RE: 0.049 Wall Xbolt Spacers

Chris,

The substitution is acceptable. However, I would still like to see that this is repeatable. Per my earlier suggestion, I assume production is building a couple of tubes with 0.049 wall crossbolt spacers to verify that there is no cracking after several swagings???

David

---

**From:** Chris Provencal [mailto:cprovencal@dartaero.com]  
**Sent:** Wednesday, March 16, 2011 9:14 AM  
**To:** David Shepherd  
**Cc:** Mike Petsche  
**Subject:** 0.049 Wall Xbolt Spacers

David,

To approve the re-worked xbolt spacers, I'd need to attach an email from you giving OK to substitute the 0.058" wall crossbolt spacers with 0.049" wall crossbolt spacers. The crossbolt spacers are otherwise made to D4202 Rev. A.

The justification would be the initial testing, as recorded in the original design review, which showed that 0.049" wall xbolt spacers were stronger than welded/c-bored crossbolt spacers. These finding were confirmed when we tested another batch of swaged vs welded samples yesterday (March 15<sup>th</sup>, 2011).

Chris

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.03.16	CP 11.03.16 BS/07L	RE-WORK CRACKED 0.058" WALL XBOLT SPACERS. REPLACE WITH 0.049" WALL XBOLT SPACERS THAT ARE OTHERWISE MADE TO D4202 REV.A				CP 11.03.16 BS/07L	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries